REMARKS

By this Amendment, claims 1 and 10 have been amended to further recite the claimed invention without any intention of narrowing the scope of the claims. Claim 17 has been cancelled without prejudice or disclaimer and new claims 18-22 have been added. Applicant has amended the currently pending claims in order to expedite prosecution and does not, by this Amendment, intend to abandon subject matter of the claims as originally filed or later presented, and reserves the right to pursue such subject matter in a continuing application. No new matter has been added. Claims 1-13, 15, 16 and 18-22 are pending. Reconsideration and allowance of the present application based on the following remarks are respectfully requested.

Claims 1-12 and 15-17 were rejected under 35 U.S.C. § 103(a) based on European Patent Application Publication No. 1020897 to Tanaka (hereinafter "Tanaka") in view of U.S. Patent No. 6,533,952 to Klebanoff (hereinafter "Klebanoff"). The rejection is respectfully traversed.

Applicant respectfully submits that the cited portions of Tanaka, Klebanoff, and any proper combination thereof fail to disclose, teach or suggest a lithographic projection apparatus comprising, *inter alia*, a gas supply, configured and arranged to supply a gaseous hydrocarbon to a space containing a mirror, at least one sensor selected from the group comprising a reflectivity sensor to monitor a reflectivity of said mirror and a pressure sensor to monitor a background pressure in said space, and a gas supply control, responsive to a signal from said at least one sensor, to control said gas supply to control a thickness of a layer formed on the mirror using the gaseous hydrocarbon as recited in claim 1.

Even assuming *arguendo* that Tanaka and Klebanoff were properly combinable (which Applicant submits they are not as discussed below), Applicant respectfully submits that the combination does not teach or suggest the claimed invention of claim 1.

The cited portions of Klebanoff fail to disclose, teach or suggest any sort of gas supply control, let alone one responsive to a signal from a sensor such as a reflectivity sensor or a pressure sensor or one configured to control a gas supply to control a thickness of a layer formed on the mirror using the gaseous hydrocarbon supplied the gas supply.

Further, Applicant submits that the cited portions of Tanaka fail to overcome the shortcomings of Klebanoff. For example, the pressure sensor of Tanaka is merely used to

determine whether a space in the optical system of Tanaka has been sufficiently evacuated so that the inert gas can be introduced and then to monitor the supply of the inert gas so as not to be overly pressurized to thereby impact optical performance. See, e.g., Tanaka, paragraphs [0044] and [0054]. Further, the pressure sensor of Tanaka is merely used to control a lens element to optically compensate for the pressure of the inert gas. See, e.g., Tanaka, paragraph [0041].

However, Applicant respectfully submits that the cited portions of Tanaka fail to disclose, teach or suggest a gas supply control, responsive to a signal from, e.g., a pressure sensor, to control a gas supply to control a thickness of a layer formed on a mirror using gaseous hydrocarbon supplied from the gas supply. Even if Tanaka were modified to include supply of hydrocarbons (which Applicant disagrees it properly could in view of Klebanoff as discussed below), it is respectfully submitted that the cited portions of Tanaka fail to provide any teaching or suggestion regarding a control system to control supply of a gas to control a thickness of a layer formed on an optical element. Tanaka at most teaches controlling whether the pressure is too high or low in the space but in no way suggest or teaches control of the supply of gas to control a thickness of a layer formed on an optical element. Indeed, Tanaka does not even disclose a layer formed on an optical element and consequently cannot even teach or suggest control supply of a gas to control the thickness of such a layer.

Further, Applicant submits that the rejection fails to set forth a proper *prima facie* case of obviousness by improperly combining Tanaka with Klebanoff. In particular, the teachings of Klebanoff and Tanaka conflict, the proposed modification of Tanaka would render the Tanaka system unsatisfactory for its intended purpose, and a reasonable expectation of success for the proposed modification has not been set forth.

The Office Action proposes that the inert gas of Tanaka may be supplemented with hydrocarbons or else substituted with hydrocarbons, since as the Office Action asserts Tanaka "does not teach to prohibit supplying hydrocarbons." Respectfully, this is contrary to the teachings of Tanaka and alien to those skilled in the art. Indeed, such a combination or substitution would render the Tanaka system unsatisfactory for its intended purpose. In particular, the cited portions of Tanaka disclose the aim of having an optical system with hardly any ArF excimer laser light attenuation. See, e.g., Tanaka, para. [0011]. To that end, the cited portions of Tanaka disclose circulating inert gas through spaces in the optical system to improve transmittance by removing "foreign matter...such as water and hydrocarbons or other substances

that diffuse the exposure light [, that] become adhered to the lenses 21 or suspended within the light path." See Tanaka, paragraph [0044]. Therefore, the Office Action's assertion that Tanaka's system may be configured to add hydrocarbons, which Tanaka characterizes as "foreign matter" that attenuates ArF laser light and which Tanaka expressly discloses removing through circulation of inert gas, simply flies in the face of Tanaka's teachings and the understanding of those skilled in the art. Indeed, Applicant submits that the cited portions of Tanaka expressly teach against supplying hydrocarbons into the spaces in an optical system and thus cannot be combinable with any art that teaches such supply of hydrocarbons into a space having an optical element.

Indeed, the cited portions of Klebanoff provide teachings that clearly conflict with Tanaka and that would render unsatisfactory the Tanaka system. Particularly, Klebanoff disclose supplying hydrocarbons but in combination with the presence of water vapor and EUV radiation. See, e.g., Klebanoff, col. 3, lines 60 to col. 4, line 7. Moreover, the presence of such hydrocarbons can lead to reduction in the reflectivity of mirror surfaces. See, e.g., Klebanoff, col. 4, lines 8-15. To help overcome this reduction of reflectivity, Klebanoff discloses providing oxygen containing gas. Thus, Klebanoff discloses providing hydrocarbons, water vapor and oxygen, each of which Tanaka expressly teach to keep out of the optical system to improve transmittance. Thus, the addition of hydrocarbons in the Tanaka system directly conflicts with the teachings of Tanaka and would render the Tanaka system unsatisfactory for its intended purpose of having high transmittance.

The Office Action asserts that, like Tanaka, Klebanoff teaches eliminating/removing of contaminants including species of hydrocarbon. Applicant respectfully disagrees that the cited portions of Klebanoff teach such. Rather, the cited portions of Klebanoff disclose reducing or eliminating contamination of a surface of an optical element. See, e.g., Klebanoff, col. 6, lines 10-13. That is not the same as eliminating/removing contaminants like in Tanaka. In the cited portions of Tanaka, the hydrocarbons are removed from the space of the optical element by the flow of inert gas; in an embodiment of Klebanoff, carbon is detached from the surface of the optical element but the hydrocarbon is still present in the space of the optical element.

Further, even if the proposed combination were otherwise proper, the Office Action has not shown a reasonable expectation of success for the proposed combination. The teachings of Klebanoff relate to high energy radiation, such as EUV radiation, while the teachings of Tanaka

relate to relatively low energy radiation, i.e., ArF laser radiation. It is not clear that the introduction of hydrocarbons as taught by Klebanoff would be effective in the ArF system of Tanaka and the Office Action has not made the appropriate showing that there would be a reasonable expectation of success.

Thus, there is no reasoned and well-articulated basis for the combination of Tanaka and Klebanoff as applied to the claims of the present application, and the asserted combination is improper.

Therefore, for at least the above reasons, the cited portions of Tanaka, Klebanoff, and any proper combination thereof fail to disclose, teach or suggest all the features recited by claim 1.

For similar reasons as provided above with respect to claim 1, Applicant respectfully submits that the cited portions of Tanaka, Klebanoff, and any proper combination thereof fail to disclose, teach or suggest a method of manufacturing a device using a lithographic projection apparatus comprising, *inter alia*, supplying a gaseous hydrocarbon to a space within the lithographic projection apparatus containing a mirror, monitoring at least one of a reflectivity of said mirror and a background pressure in said space, and controlling an amount of gaseous hydrocarbon supplied to said space in response to the monitoring to control a thickness of a layer formed on the mirror using the gaseous hydrocarbon as recited in claim 10.

As noted above, Applicant respectfully submits that Tanaka and Klebanoff are not properly combinable as the teachings of Klebanoff and Tanaka conflict, the proposed modification of Tanaka would render the Tanaka system unsatisfactory for its intended purpose, and a reasonable expectation of success for the proposed modification has not been set forth. Moreover, even assuming *arguendo* that Tanaka and Klebanoff were properly combinable (which Applicant submits they are not), Applicant respectfully submits that the combination does not disclose, teach or suggest controlling an amount of gaseous hydrocarbon supplied to said space in response to the monitoring to control a thickness of a layer formed on the mirror using the gaseous hydrocarbon.

Therefore, for at least the above reasons, the cited portions of Tanaka, Klebanoff, and any proper combination thereof fail to disclose, teach or suggest all the features recited by claim 10.

Applicant also respectfully submits that the cited portions of Tanaka, Klebanoff, and any proper combination thereof fail to disclose, teach or suggest a method of manufacturing a device using a lithographic projection apparatus comprising, *inter alia*, supplying a gaseous alcohol to a

space in a radiation system of the lithographic projection apparatus, which space contains a mirror, wherein the alcohol forms a cap layer on said mirror, wherein the projecting causes sputtering of the cap layer, and wherein the gaseous alcohol is supplied to said space at a pressure sufficient to achieve a thickness of said cap layer which does not increase substantially over time as recited in claim 15.

Klebanoff discloses combining water vapor and ethanol in certain measure, and exposing both to EUV radiation, to balance the carbon build-up resulting from exposure to ethanol against the reduction of oxidation due to the water vapor. The result, according to Klebanoff, is a relatively thin layer of carbon (about 5 angstroms). However, Klebanoff fail to appreciate or address the effects of sputtering and the need to protect the mirror from such sputtering. Indeed, the Office Action has not identified any part of Klebanoff that discloses, teaches or suggests sputtering and indeed Applicant submits that the cited portions of Klebanoff fail to provide any such disclosure, teaching or suggestion. Thus, for example, the application of the process of Klebanoff in a production lithographic apparatus that has sputtering may not even result in Klebanoff's thin layer because it would be sputtered away.

Accordingly, Applicant respectfully submits that Klebanoff fail to disclose, teach or suggest supplying gaseous alcohol at a pressure sufficient to achieve a thickness of a cap layer which does not increase substantially over time where the projecting causes sputtering of the cap layer. In effect, a cap layer is maintained to protect the mirror but it is one that does not increase substantially over time so that it, for example, does not significantly affect the performance of the mirror.

Therefore, for at least the above reasons, the cited portions of Tanaka, Klebanoff, and any proper combination thereof fail to disclose, teach or suggest all the features recited by the claims 1, 10 and 15. Claims 2-9 depend from claim 1 and are, therefore, patentable for at least the same reasons provided above related to claim 1, and for the additional features recited therein. Claims 11 and 12 depend from claim 10 and are, therefore, patentable for at least the same reasons provided above related to claim 10, and for the additional features recited therein. Claim 16 depends from claim 15 and is, therefore, patentable for at least the same reasons provided above related to claim 15, and for the additional features recited therein. Claim 17 has been cancelled and so its rejection is now moot. As a result, Applicant respectfully submits that the rejection

under 35 U.S.C. §103(a) of claims 1-12 and 15-17 in view of Tanaka and Klebanoff should be withdrawn and the claims allowed.

Claim 13 was rejected under 35 U.S.C. § 103(a) based on Tanaka in view of Klebanoff and further in view of U.S. Patent No. 6,469,785 to Duveneck (hereinafter "Duveneck "). The rejection is respectfully traversed.

As discussed above, Applicant submits that the cited portions of Tanaka in view of Klebanoff fail to disclose, teach or suggest claim 10.

Furthermore, the cited portions of Duveneck fail to overcome any of the deficiencies of Tanaka, Klebanoff, or any proper combination thereof. The cited portions of Duveneck simply have no disclosure, teaching or suggestion regarding monitoring at least one of a reflectivity of said mirror and a background pressure in said space; and controlling an amount of gaseous hydrocarbon supplied to said space in response to the monitoring to control a layer formed on the mirror using the gaseous hydrocarbon as recited in claim 10. Duveneck is merely cited to disclose a multilayer mirror.

Therefore, for at least the above reasons, the cited portions of Tanaka, Klebanoff, Duveneck and any proper combination thereof fail to disclose, teach or suggest all the features recited by claim 13. As a result, Applicant respectfully submits that the rejection under 35 U.S.C. §103(a) of claim 13 in view of Tanaka, Klebanoff and Duveneck should be withdrawn and the claim allowed.

Further, Applicant submits that new claims 18-22 are patentable over the applied references. Claims 18 and 19 depend from claims 1 and 10 respectively and are, therefore, patentable for at least the same reasons provided above related to claims 1 and 10 respectively, and for the additional features recited therein. Further, Applicant respectfully submits, for similar reasons as discussed above, that the applied references fail to disclose, teach or suggest a lithographic projection apparatus comprising, *inter alia*, a gas supply configured to supply a gaseous hydrocarbon to a space containing a mirror and a gas supply control configured to control supply of the gaseous hydrocarbon to the space to maintain a layer formed on the mirror using the gaseous hydrocarbon at a substantially constant thickness in response to at least sputtering caused during supply of the projection beam as recited in claim 20. Claims 21 and 22

depend from claim 20 and are, therefore, patentable for at least the same reasons provided above related to claim 20, and for the additional features recited therein.

All rejections having been addressed, it is respectfully submitted that the present application is in a condition for allowance and a Notice to that effect is earnestly solicited. If any point remains in issue which the Examiner feels may be best resolved through a personal or telephone interview, please contact the undersigned at the telephone number listed below.

Please charge any fees associated with the submission of this paper to Deposit Account Number 03-3975 under Order No. 081468/282980. The Commissioner for Patents is also authorized to credit any over payments to the above-referenced Deposit Account.

Respectfully submitted,
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